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Flipse, A.C.

### ***published in***

Annals of Science  
2008

### ***DOI (link to publisher)***

[10.1080/00033790701861814](https://doi.org/10.1080/00033790701861814)

### ***document version***

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

### ***citation for published version (APA)***

Flipse, A. C. (2008). Against the Science-Religion Conflict: the Genesis of a Calvinist Science Faculty in the Netherlands in the Early Twentieth Century. *Annals of Science*, 65(3), 363-391.  
<https://doi.org/10.1080/00033790701861814>

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## Annals of Science

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tasc20>

### Against the Science-Religion Conflict: the Genesis of a Calvinist Science Faculty in the Netherlands in the Early Twentieth Century

Abraham C. Flipse<sup>a</sup>

<sup>a</sup> Department of History and Social Aspects of Science, Faculty of Sciences, Vrije Universiteit, De Boelelaan 1081, 1081 HV, Amsterdam, The Netherlands E-mail:

Version of record first published: 12 Jun 2008.

To cite this article: Abraham C. Flipse (2008): Against the Science-Religion Conflict: the Genesis of a Calvinist Science Faculty in the Netherlands in the Early Twentieth Century, *Annals of Science*, 65:3, 363-391

To link to this article: <http://dx.doi.org/10.1080/00033790701861814>

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## Against the Science–Religion Conflict: the Genesis of a Calvinist Science Faculty in the Netherlands in the Early Twentieth Century

ABRAHAM C. FLIPSE

Department of History and Social Aspects of Science, Faculty of Sciences,  
Vrije Universiteit, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands  
E-mail: [ac.flipse@few.vu.nl](mailto:ac.flipse@few.vu.nl)

Received 18 September 2007. Revised paper accepted 21 November 2007

### Summary

This paper gives an account of the establishment and expansion of a Faculty of Science at the Calvinist ‘Free University’ in the Netherlands in the 1930s. It describes the efforts of a group of orthodox Christians to come to terms with the natural sciences in the early twentieth century. The statutes of the university, which had been founded in 1880, prescribed that all research and teaching should be based on Calvinist, biblical principles. This ideal was formulated in opposition to the claim of nineteenth-century scientific naturalists that there was an inherent conflict between science and religion. However, despite their selection on the basis of their strict Calvinist beliefs, the first science professors attributed a certain independence to the domain of science. They agreed with the criticism of the conflict thesis, and tried to defuse the tensions between science and religion, although mainly at the level of philosophy and history, looking for example for harmony between science and religion in the past. Ironically, as a result of this approach, the Calvinist scientists mainly contributed to the acceptance of mainstream science in Dutch Calvinist circles, contrary to developments in other countries (notably the USA) where the conflict between science and orthodox Christianity has reasserted itself.

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### 1. Introduction

‘The “monkey trial” in the Netherlands’ was the headline in a liberal Dutch newspaper in September 1925 reporting on the charge against the Reformed minister

J. G. Geelkerken. In a sermon, Geelkerken had expressed his doubts concerning the literal reading of the story of the Fall in Genesis 2 and 3. A heated debate had arisen as to whether this view was acceptable, a debate that was quickly simplified by outsiders to the question: ‘did or didn’t the serpent speak?’ The newspaper compared the ecclesiastical process against Geelkerken—who was suspended by the Reformed Synod in 1926—with the trial in the US town of Dayton in Tennessee, where the science teacher J. T. Scopes was convicted for teaching the Darwinian theory of human evolution. This ‘monkey trial’ had attracted a great deal of media attention in the USA and elsewhere. Both the jury members in Dayton and the Reformed leaders who had suspended Geelkerken were fundamentalists, and they held on to a naive and outdated conviction, the newspaper commented sneeringly.<sup>1</sup>

However, the Dutch Calvinists were not as other-worldly and hostile to science as this article suggested. Since the end of the nineteenth century, they had played, under the leadership of the theologian and politician Abraham Kuyper, an increasingly prominent role in society, politics and academic life. One of Kuyper’s initiatives was the founding of a Reformed university in 1880: the ‘Free University’. This university distinguished itself by its religious principles. Its declared aim was the development of an alternative, Christian science, alongside and in opposition to, the mainstream ‘naturalistic’ science.

Until 1930, this university had comprised only three faculties, Theology, Law, and Arts, but a plan was developed to appoint three professors in the sciences and establish a Faculty of Science in October 1930. In the late 1920s, the governors of the Free University had tried to find scientists willing to accept appointments as professors at the university. When finally three young men—a chemist, a physicist, and a mathematician—accepted the appointments, this was a great relief for the governors, because it had proved very difficult to find scientists who combined scientific qualities with the ‘correct’ religious beliefs. When they were appointed, the three young professors were faced with the task of developing research and teaching programmes from scratch. According to the statutory principles of the university, their work had to be in accordance with strictly Calvinist, biblical guidelines. After the verdict of the Reformed synod in the Geelkerken controversy—to which the university conformed itself—it seemed there could be no misunderstanding about these guidelines.

This paper aims to shed light on the struggle of the Dutch Calvinists to come to terms with the natural sciences in the first half of the twentieth century, a process that started in the 1880s and was to continue until the early 1970s. The events and discussions surrounding the formation of the Science Faculty proved to be a turning point in this development, and we will therefore focus especially on this episode. To place the discussion about the Science Faculty in context, we will first give a short overview of the foundation of the Free University in 1880 and the attempts of the founder, Abraham Kuyper, to achieve a certain synthesis of science and religion. Second, the debate about the foundation of the faculty and the search for suitable professors is described. Third, the expansion of the new faculty during the first

<sup>1</sup> ‘De “monkey trial” in Nederland’, *Het Vaderland*, 8 September 1925. For a recent discussion of the Scopes trial, see Edward J. Larson, ‘The Scopes Trial in History and Legend’, in *When Science and Christianity meet*, edited by David C. Lindberg and Ronald L. Numbers (Chicago, 2003), 245–64. On the Geelkerken controversy: *De kwestie-Geelkerken. Een terugblik na 75 jaar*, edited by George Harinck (Barneveld, 2001).



Figure 1. Abraham Kuyper, Dutch theologian, statesman, journalist, leader of the Dutch neo-Calvinist movement, and founder of the Free University. The photo is from 22 October 1898, after Kuyper had received an honorary doctorate at Princeton.

decade of its existence and the efforts of the science professors to deal with the Calvinist character of the university are discussed. Finally, the course of events is interpreted more generally against the background of the changing cultural context before, during, and after the formation of the faculty, and some remarks are made about the developments later in the century.<sup>2</sup>

The underlying aim is to throw new light on the early-twentieth-century discussions about science and religion. So far, historical research into this period has focused mainly on the emerging creationist movement and its crusade against evolutionism in the United States in the 1920s. Elsewhere, however, developments took a different course. The customary view is that, after the nineteenth-century conflicts had eased off, in most countries scientists and people of faith went their

<sup>2</sup> Archives that were consulted at the Free University, Amsterdam: Senate's Archives; Curators' Archives; Directors' Archives; Faculty of Sciences' Archives. At the Historical Documentation Centre for Dutch Protestantism, Amsterdam (HDC): G.J. Sizoo's Archives; J. Coops's Archives, and Physics VU Archives.

separate ways and that, as a result, the interaction between science and religion became minimal in the course of the twentieth century. Peter Bowler, however, has challenged this characterization for the case of Britain. He has shown that the early decades of the century witnessed a lively debate on matters of science and religion. In these discussions, science was not placed in opposition to religion, but on the contrary, many attempts were made to use a non-materialistic approach to science to bring about a reconciliation with (liberal) Christianity.

The study of other countries and religious subcultures can highlight other aspects of the changing relation of science and religion within the context of local history. This paper aims to add the history of the Dutch Calvinist subculture to the discussion. At first sight, the position of the Dutch Calvinists bears a strong resemblance to that of the US fundamentalists in this period, both groups placing themselves more or less outside mainstream culture and being very critical about professional mainstream science. For both groups, the 'conflict between science and religion' was real. Yet, by detailing the genesis of the faculty, we will show how the founders of the university in 1880, the governors and theologians in the following decades and finally the Calvinist scientists themselves tried to overcome this conflict.<sup>3</sup>

## 2. The Dutch Calvinists, the Free University, and the sciences

In order to understand the aspiration of the Dutch Calvinists to establish their own university, the role of the sciences in society, in particular in The Netherlands, in the late nineteenth century has to be appreciated. The second half of the nineteenth century had seen an increasing influence of the sciences in all areas of society. The remarkable success of the natural sciences, with applications in technology and industry, reinforced the idea that science could solve all the riddles of the universe and that orthodox religion was outdated. At the Dutch universities, the theologians tried to adapt their theology to the scientific world view and to biblical criticism, which resulted in so-called 'modernist theology'. However, a considerable proportion of Dutch churchgoers—both in the Dutch (National) Reformed Church (*Nederlandse Hervormde Kerk*) and in various separatist churches—were less favourable to modern culture. People from all strata of society were members of this orthodox group, but the majority were formed by so-called *kleine luyden* ('small people', the Protestant lower middle classes). The theologian Abraham Kuyper (1837–1920) set himself up as the leader of this marginalized group of Calvinists, who until then had had no

<sup>3</sup> For the creationist movement, see Ronald L. Numbers, *The Creationists. From Scientific Creationism to Intelligent Design. Expanded Edition* (Cambridge MA, 2006). For the situation in Britain, see Peter J. Bowler, *Reconciling science and religion. The Debate in Early-Twentieth-Century Britain* (Chicago, 2001). For some general remarks on the developments in the early twentieth century, see John Hedley Brooke, *Science and Religion. Some Historical Perspectives* (Cambridge, 1991), 321–47 and the references mentioned in the biographical essay: 399–403. For other case studies of orthodox protestants (esp. evangelicals) dealing with the sciences in different contexts mainly before the twentieth century, see *Evangelicals and Science in Historical Perspective*, edited by David N. Livingstone, D.G. Hartt and Mark A. Noll (New York, 1999); on the importance of locality in the encounter of science and belief, see the essay of David N. Livingstone, 'Situating Evangelical Responses to Evolution' in this volume, 193–219. For a short overview of science and religion in Dutch history, see Rienk Vermij, 'Science and belief in Dutch History', in *A History of Science in the Netherlands. Survey, Themes and Reference*, edited by Klaas van Berkel, Albert van Helden and Lodewijk Palm (Leiden, 1999), 332–47; and K. van Berkel, 'Een ontmantelde metafoer. Over de geschiedenis van het conflict tussen geloof en wetenschap, in het bijzonder in Nederland', in a special issue on faith and science in the Netherlands of *Gewina. Tijdschrift voor Geschiedenis der Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek*, 17 (1994), 57–67.

voice in the church, with its modernist theologians, and in Dutch society, which was dominated by a liberal elite<sup>4</sup> (Figure 1).

Under Kuyper's leadership, a process of emancipation started, and the Calvinists began to set up their own private schools, a political party, their own newspapers, etc. In the end, a powerful Christian subculture was created. Later, other groups within the Netherlands, such as the Roman Catholics and socialists followed this example. This encouraged the development of a pattern of social organization which in later years was called *verzuiling* (pillarization): a 'vertical division' of society into various pillars: confessional and ideological groups, cutting more or less through the class structure of society. In the period between about 1920 and 1960, all these groups existed in relative isolation but at the same time adapted to the general culture and tried to formulate answers to the challenges of the age.<sup>5</sup>

Kuyper was simultaneously active in many social domains, and he had a great influence on Dutch society. From the 1860s, he tried to increase the influence of the orthodox wing within the Dutch Reformed Church. However, in the end, his efforts led to a schism in 1886. The orthodox wing partly broke away from the Dutch Reformed Church and, in 1892, merged with another orthodox separatist church to form the *Gereformeerde Kerken in Nederland* (Reformed Churches in the Netherlands), within which Kuyper had great authority. In politics, the formation of the *Anti-Revolutionaire Partij* (Anti-Revolutionary Party)—the first popular political party with a modern organization in the Netherlands—in 1879 was mainly the work of Kuyper. The growing influence of the Calvinists in politics resulted in the formation of a coalition cabinet of orthodox Protestants and Catholics that governed the country in the period 1901–1905, with Kuyper as Prime Minister.<sup>6</sup>

Kuyper felt that the academic world could not be ignored either, and he therefore aimed at the establishment of a Calvinist university. One of the motives was the predominance of modernist theologians within the theology faculties of the state universities. However, this Calvinist university was to be more than a training college for orthodox ministers; it would have to comprise all faculties and disciplines. In 1879, Kuyper and his sympathizers had founded the 'Society for Higher Education on the Basis of Reformed Principles', aimed at establishing a 'Free' University.

<sup>4</sup> On the late-nineteenth-century Netherlands, the situation in the Dutch (National) Reformed Church and the emerging neo-Calvinist movement, see, e.g., Jan Bank en Maarten van Buuren, 1900: *The Age of Bourgeois Culture*, Dutch Culture in a European Perspective Volume 3 (Assen, 2004), 305–45; J.C.H. Blom, 'The Netherlands since 1830', in *History of the Low Countries*, edited by J.C.H. Blom and E. Lamberts, translated by James C. Kennedy (New York, New Edition 2006), 393–469, esp. 404–10. On modernist theology: Mirjam Buitenwerf-van der Molen, *God van vooruitgang. De popularisering van het modern-theologische gedachtegoed in Nederland (1857–1880)* (Hilversum, 2007).

<sup>5</sup> On the phenomenon of pillarization, a great deal has been published by both historians and social scientists. For an introduction, see, e.g., J.C.H. Blom (note 4), 393–469, esp. 418–22, 431–38 and 504 for more references; and *De verzuiling voorbij. Godsdienst, stand en natie in de lange negentiende eeuw*, edited by J.C.H. Blom, J. Talsma (Amsterdam, 2000). On pillarization as part of a wider, Western European modernization process (and a survey of other opinions): Janneke Adama, 'Verzuiling als metafoor voor moderniseren' (with a summary in English: "'Pillarization" as a Metaphor for Modernization'), in *Moderniteit. Modernisme en massacultuur in Nederland 1914–1940*, edited by Madelon de Keizer and Sophie Tate (Zutphen, 2004), 265–83. For the question of whether Kuyper's ideas contributed to the development of pillarization and for more references: Peter S. Heslam, *Creating a Christian Worldview. Abraham Kuyper's Lectures on Calvinism* (Grand Rapids Mich., 1998), 2–3, 24–5, 158–60, 263.

<sup>6</sup> A great deal has been written about Kuyper and his neo-Calvinist ideas, both in Dutch and English. Recently, a long-awaited biography was published: Jeroen Koch, *Abraham Kuyper: een biografie* (Amsterdam, 2006). For an introduction to Kuyper's neo-Calvinism in its historical context and for references to more secondary literature: Peter S. Heslam (note 5).

Alongside and in opposition to the secular State Universities, Kuyper placed his Free University, which had no official ties with the state or with the established Church but was only committed to its own principles. In Kuyper's conception of society, it was not the state that was primarily responsible for the universities; the 'scientific sphere' had to be free from political as well as ecclesiastical control.<sup>7</sup> The Free University (*Vrije Universiteit*, hereafter called the VU) was founded in 1880 in Amsterdam, comprising three faculties: Theology, Law, and Arts. The Society for Higher Education was responsible for, and governed, the VU through a board of directors. The Society was also the channel through which the relation between the VU and its Calvinist supporters was maintained. This was very important, because the university could not survive without its supporters, not only for its funding (the VU was not subsidized by the government) but also for moral support and the supply of students. Many activities were organized for the sympathizers in the country, such as annual meetings, at which they were informed about developments at the VU and where lectures on science and religion were delivered. In addition, an annual report and a newsletter were published, so that it was possible for the ordinary Calvinist people to be closely involved.<sup>8</sup> The Calvinist Free University was therefore a social meeting place of the world of orthodox faith and academia.

In Kuyper's view, the VU should also be the place where modern science and orthodox belief would meet as regards ideas. The aim was to develop a Christian science, founded on Calvinist principles. The concept of a Christian Science was developed by Kuyper to provide an alternative for the secular or modernist way of thinking prevalent in academic circles in the Netherlands. The statutes of the Society for Higher Education stated that all teaching and research at the VU should be based on *gereformeerde beginselen* (Calvinist principles). The Calvinists used the term 'principles' to refer to their basic beliefs, not only in science, but also in politics and other cultural areas. The 'principles' were almost seen as a kind of axiom from which one should be able to deduce a scientific theory or a political programme, sometimes even without a profound foundation on the basis of recent scientific data or social actuality. For decades, this 'principled thinking' was a characteristic (in its strengths and weaknesses) of all Kuyper's followers.<sup>9</sup> In general, the principles were less elaborate than desired, and the vagueness of the concept of 'Calvinist principles' sometimes led to conflicts among the Calvinist leaders: the VU professors, politicians, and opinion leaders (functions that were not seldom united in the same person). Besides, it was far from clear what exactly these Calvinist principles implied for the individual scientific disciplines.<sup>10</sup>

<sup>7</sup> See especially Abraham Kuyper, *Sovereiniteit in eigen kring. Rede ter inwijding van de Vrije Universiteit, den 20sten October 1880 gehouden, in het koor van de Nieuwe Kerk te Amsterdam* (Amsterdam, 1880). A translation of this speech can be found in *Abraham Kuyper. A Centennial Reader*, edited by J.D. Bratt (Grand Rapids, 1998). See also Heslam (note 5), 192–93.

<sup>8</sup> Society for Higher Education on the basis of Reformed Principles: *Vereeniging voor Hooger Onderwijs op Gereformeerden Grondslag*, hereafter abbreviated: Society for Higher Education. The annual report: *Jaarverslag van de Vereeniging voor Hooger Onderwijs op Gereformeerden grondslag* (1881–1924) and *Jaarboek der Vrije Universiteit te Amsterdam* (1925–1989/1990), hereafter abbreviated: *Jaarboek VU*. The newsletter: *Vrije Universiteitsblad. Maandelijke mededeelingen* (1932/1933–1969), hereafter *VU-blad*.

<sup>9</sup> Heslam (note 5), 183.

<sup>10</sup> J. Roelink, *Een blinkend spoor. Beeld van een eeuw geschiedenis der Vereniging voor wetenschappelijk onderwijs op gereformeerde grondslag 1879–1979* (Kampen, 1979), 9–31; Ab Flipse, *Hier leert de natuur ons zelf den weg. Een geschiedenis van Natuurkunde en Sterrenkunde aan de VU* (Zoetermeer, 2005), 24–26. Compare A.Th. van Deursen, *Een hoeksteen in het verzuild bestel. De Vrije Universiteit 1880–2005* (Amsterdam, 2005), 23–7, 62–66.



Despite Kuyper's rhetoric, the foundation of the VU did not mark the sudden naissance of a complete Calvinist philosophy of science. Yet, in the first decades of its existence, ideas were put forward by Kuyper himself and other VU professors: the theologian Herman Bavinck (1854–1921) and the classicist Jan Woltjer (1849–1917). These ideas were of great importance for the ongoing discussion at the VU and in the Calvinist world. A brief discussion of these ideas will provide a framework for understanding the debates about religion and the sciences in the period preceding the formation of the Science Faculty.<sup>11</sup> Kuyper's views are evident from his inaugural lecture *Sovereiniteit in eigen kring* (Sphere Sovereignty, 1880), his Stone Lecture on 'Calvinism and Science', which he gave at Princeton Seminary in 1898, and passages of his *Encyclopaedie der Heilige Godgeleerdheid* (Encyclopaedia of Sacred Theology, 1893–1895).<sup>12</sup> In these works, Kuyper stated—in contrast to proponents of the idea that there had always been 'warfare' between science and faith—that such a conflict did not exist. The 'conflict rhetoric', used by scientific naturalists like T. H. Huxley, had also been taken up in the Netherlands by some secularist freethinkers, but it was not generally accepted among Dutch scholars. Nevertheless, the idea that science and religion were antagonistic was widespread among orthodox religious people. According to Kuyper, however, there was no conflict between science and religion. The real conflict was the 'antithesis' between 'normalism' (a secular, naturalistic world view) and 'abnormalism' (a theistic world view). Kuyper argued that science is not religiously neutral but is affected by faith: 'Every science in a certain degree starts from faith, and, on the contrary, faith which does not lead to science, is mistaken faith'.<sup>13</sup> A conflict between Christian and non-Christian science was inevitable, because they started from different religious presuppositions or principles.

In his speech 'Sphere Sovereignty', Kuyper also insisted that 'the principles' were important for all faculties, including that of the 'natural sciences', and he attempted to refute everyone who 'can scarcely control a smile when someone scoffs at "Christian medicine" and "Christian logic"'. Nevertheless he admitted that if research was limited 'to weighing and measuring, the wedge of principle would not be at the door'.<sup>14</sup> An example of this approach to the natural sciences is Kuyper's view of the theory of evolution. In his famous rectorial address *Evolutie* (Evolution, 1899), in which he opposed 'the hypnosis of the dogma of evolution' under which 'our

<sup>11</sup> A great deal has been written about Kuyper's ideas on science and the university, in both English and Dutch. See Peter S. Heslam (note 5), esp. 167–95 and 18–24 for references to secondary literature; Del Ratzsch, 'Abraham Kuyper's Philosophy of Science', in *Facets of Faith and Science*, edited by Jitse M. van der Meer, 4 vols (Lanham, 1996), II: *The Role of Beliefs in Mathematics and the Natural Sciences: An Augustinian Perspective*, 1–32. Besides the contribution of Ratzsch that explicitly discusses Kuyper's philosophy of science, in vol. II of *Facets of Faith and Science*, in many other chapters aspects of the neo-Calvinist model for the interaction of faith and science are discussed. See also Jeroen Koch (note 6), 221–38; J. Klapwijk, 'Abraham Kuyper over wetenschap en universiteit', in *Abraham Kuyper. Zijn volksdeel zijn invloed*, edited by C. Augustein, J.H. Prins and H.E.S. Woldring (Delft, 1987); Van Deursen (note 10), 15–74; J. Stellingwerff, *Dr. Abraham Kuyper en de Vrije Universiteit* (Kampen, 1987). For translations of Kuyper's work and a selected bibliography of secondary literature see *Centennial Reader* (note 7).

<sup>12</sup> Kuyper (note 7); Abraham Kuyper, 'Calvinism and Science', in *Calvinism: Six Stone-lectures* (Amsterdam, 1899), 143–88; Abraham Kuyper, *Encyclopaedie der Heilige Godgeleerdheid*, 3 vols 1894 (Kampen, 1908, 2nd edition), II, 97–161.

<sup>13</sup> Kuyper, 'Calvinism and Science' (note 12), 173–9, esp. 176. On the nineteenth-century idea of a conflict between science and religion against which Kuyper formulated his alternative model: Heslam (note 5), 190–2.

<sup>14</sup> Kuyper (note 7), 33–5; *Centennial Reader* (note 7), 487. Here and hereafter, if possible, translations of Kuyper are from *Centennial Reader* (note 7); otherwise they are my own.

nineteenth century is dying away', he acknowledged that evolution as such did not inevitably exclude belief in a Creator. The real problem for Kuyper was the universal claim of evolutionary naturalism that repudiated the essence of ethics, aesthetics, and religion. Therefore, according to Kuyper, 'the Christian religion and the theory of evolution are two mutually exclusive systems'.<sup>15</sup>

In line with Kuyper, the theologian Bavinck criticized the positivistic ideal that advocated scholarship without metaphysical presuppositions; instead, he stressed the influence of faith on science, especially at the level of the underlying worldview. In some places, however, he stated that science is about truth and that therefore science as such is not Christian or unchristian. Christianity teaches us the right attitude towards nature for practising science, and that is the reason why we can speak of Christian science.<sup>16</sup> The classicist Woltjer drew a clearer line between empirical research, where the principles do not play a role, and the domain where they do. When discussing Lorentz's electron theory in 1914, he stated that in this domain, 'nature itself teaches us'. But when something is to be said about the 'essence' of matter, the origin and the order of the world, and other issues in 'natural philosophy', the principles play a decisive role, he argued.<sup>17</sup>

In short, in this period there was a strong conviction that it would be possible to develop a Christian science in one way or another. In the neo-Calvinist philosophy, all the humanities and sciences formed a unity, sprouting from the same roots: 'the principles' that could be found in Scripture. The new Christian scholarship at the VU had to be built from scratch on the basis of these principles. A start was made with this project in the Faculties of Theology, Law and Arts. Despite the claimed importance of the religious principles for the whole domain of knowledge, in this period a strict Biblicism was rejected, and a relative autonomy for the 'lower levels' of the sciences was acknowledged.<sup>18</sup>

### 3. Towards the foundation of the Faculty of Science

The decision, in 1927, to found a Science Faculty did not come out of the blue. The idea had been advocated by several persons during the first decades of the VU, including Abraham Kuyper, who had advanced ideological arguments, such as those described in the section above. At the end of his 1899 *Evolutie* speech, Kuyper proclaimed: 'He who is not a stranger to the fundamental struggle of our days, will agree with me that the most important decisions are nowadays being made in the

<sup>15</sup> A. Kuyper, *Evolutie. Rede bij de overdracht van het rectoraat aan de Vrije Universiteit op 20 October 1899* (Amsterdam, 1899), 7, 39, 43, 45, 12; *Centennial Reader* (note 7), 412. See also Ilse N. Bulhof, 'The Netherlands', in *The Comparative Reception of Darwinism*, edited by Thomas F. Glick (Austin, 1972), 269–306, on 304; R.P.W. Visser, 'Van afwijzing naar aanpassing. Nederlandse Gereformeerden over Darwins Evolutietheorie, 1900–1960', *Gewina. Tijdschrift voor de Geschiedenis der Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek*, 17 (1994), 112–27, on 113–15.

<sup>16</sup> H. Bavinck, 'Christendom en natuurwetenschap', *Stemmen des tijds. Maandblad voor Christendom en cultuur*, 2 (1913), 343–77; H. Bavinck, *Christelijke wetenschap* (Kampen, 1904), esp. 121. On Bavinck and science see also A. Woltjer, 'Herman Bavinck on faith and science', in *Facets of Faith and Science* (note 11), II, 33–56.

<sup>17</sup> J. Woltjer, 'Het wezen der materie', in *Wetenschappelijke samenkomst op 1 juli 1914* (Amsterdam, 1914), 3–30, on 7. ['de natuur [leert] ons zelf den weg'] On Woltjer: H. van der Laan, *Jan Woltjer (1848–1917). Filosoof, classicus, pedagoog* (Amsterdam, 2000).

<sup>18</sup> On Kuyper's view on the authority of scripture: Heslam (note 5), 125–32. Heslam states, however, that in practice, Kuyper's ideas were very close to that of the US biblicist ('inerrantist') B.B. Warfield, although they had different opinions on science. On the 'lower levels' of science, see Ratzsch (note 11), 8–10.

Science Faculty [...]’. However, no concrete action for the formation of a Science Faculty was undertaken.<sup>19</sup>

At the annual meeting of 1911, Woltjer, one of the most convinced advocates of the founding of such a faculty, lectured about ‘The Science Faculty at the Free University’. The religious presuppositions, he stated, are inextricably interwoven with the scientific disciplines. And although, in practice, science at the VU would display a certain similarity with existing science, it was important that the presuppositions were discussed during the normal science courses. And therefore, he stated: ‘Let us not delay, but make every effort to constitute, within the not too distant future, a Science Faculty on the basis of our principles’.<sup>20</sup> Again, however, no concrete action was undertaken.

A decade later, at the annual meeting of 1922, one of the directors—H. Colijn (1869–1944), leader of the Anti-Revolutionary Party in the interbellum period—suddenly proposed cancelling the idea of establishing a complete university and keeping only the three existing faculties, because the financial burden for the supporters of founding a Science Faculty would be too great. His alternative plan was to look for cooperation with other universities for most of the courses and research in the sciences, and in addition to deliver ‘fundamental courses’ for the Calvinist students by the means of ‘special chairs’, to be established at other universities. Following this meeting, a heated discussion was started in the Calvinist community. A majority of sympathizers, but also of the professors and governors, were very critical of the proposal and were of the opinion that ‘the principles’ were important for the whole domain of the sciences: a ‘neutral zone’, in which cooperation with other universities was possible, did not exist and therefore special chairs were not enough, was the general opinion. Although Colijn enjoyed great authority in Calvinist circles, his proposal was rejected. A strict interpretation of the neo-Calvinist ideals was taken to imply the realization of a complete university.<sup>21</sup>

By that time, not founding a fourth faculty was, in fact, no longer a serious option. The question was rather which faculty should be the fourth. A condition in the Law of Higher Education of the Netherlands of 1905 turned out to be the deciding factor in the VU governors’ decision to found a ‘fourth faculty’ in 1930. This Law—accepted by parliament during the period of the coalition cabinet of which Kuyper himself was Prime Minister—had recognized the validity of the VU’s degrees (the so-called *effectus civilis*). One important condition was attached to the Law: the VU had to expand in the long run to a ‘complete’ university, with five

<sup>19</sup> Kuyper (note 15), 53 [‘Maar wie geen vreemdeling is in den principiëelen strijd onzer dagen, zal, na mijn rede, mij toch allicht toestemmen, dat de wetenschappelijke beslissing heden ten dage veel meer bij de Natuurkundige [...] faculteit ligt.']. Recently some books on aspects of the history of the Free University have been published, including some that especially concern the Science Faculty. These books are used throughout this paragraph. On the history of physics and astronomy: Flipse (note 10); on the history of mathematics and computer science: Hendrik Blauwendraat, *Worsteling naar waarheid. De opkomst van Wiskunde en Informatica aan de VU* (Zoetermeer, 2004); on the history of chemistry: Kirstin de Boer-van Rhenen and Nel Velthorst, *Bijzondere Chemie?! 75 jaar scheikunde aan de Vrije Universiteit* (Zoetermeer, 2005).

<sup>20</sup> Woltjer, ‘De natuurkundige faculteit aan de Vrije Universiteit’ (reprint from *Jaarboek VU* (1911)), 19. [‘Laat ons dus niet vertragen, maar alle krachten inspannen, opdat er met Gods hulp binnen niet te langen tijd aan onze Universiteit ook gelegenheid besta om, naar eisch van de door ons beleden beginselen, hooger onderwijs te ontvangen in de wis- en natuurkundige wetenschappen.’]

<sup>21</sup> G. Harinck, ‘Colijn en de Vrije Universiteit’, in *Colijn. Bouwstenen voor een biografie*, edited by J. de Bruijn and H.J. Langeveld (Kampen, 1994), 155–96, on 162–71.

faculties: a fourth faculty was to be established not later than 1930, and a fifth not later than 1955 (both comprising at least three chairs). However, lack of money, in combination with a certain fear of the natural sciences and discussions about whether a Medical Faculty or a Science Faculty had to be established first, delayed the final decision until July 1927. A start had been made with a Medical Faculty in 1907, but for several reasons this faculty remained too small to deliver a complete medical curriculum. Both a medical and a science faculty were expensive compared with the existing faculties. The VU was still completely financed by the donations of the supporting *kleine luyden*, who would have to increase their contributions substantially. A committee, constituted in the autumn of 1926, had calculated that for the moment it was impossible to maintain a complete Medical Faculty. The fastest way to establish a faculty that could actually offer a full academic curriculum and degrees was to found a Science Faculty with the minimal staff of three professors: one each for mathematics, chemistry, and physics. The decisive factor in opting for this faculty with these three disciplines was a practical one: with a minimal staff of three professors, the faculty could offer four ‘candidate’ (bachelor’s) and three ‘doctoral’ (master’s) curricula from the beginning (consisting of combinations of courses in chemistry, physics, and mathematics). The number of staff members could gradually be increased, and other disciplines, such as biology, could be added later. The general meeting of the Society for Higher Education agreed with the proposal of the committee in July 1927. Three years remained to carry out the plans.<sup>22</sup>

After the decision to found a Science Faculty had been made, the first subject of concern was to find three men to become professors, who could take care of teaching in chemistry, physics, and mathematics, and who were willing to commit themselves to the ideal of a Christian Science. Although, among the sympathizers of the VU, there was still some fear of the ‘materialistic science’ at the state universities, the governors realized that they had to look outside the circle of VU graduates for suitable candidates for the science chairs. A committee was appointed to find these men who had ‘drunk from the unbelieving science, but were protected by God’, as it was recorded in the minutes.<sup>23</sup> However, it turned out to be very difficult to find persons who met these conditions. By this time, the number of Calvinists who had graduated in one of the sciences at one of the State Universities had increased, but it was still a small group. Most of these Calvinist scientists had formed a Christian Society for Scientists and Physicians, and in this society the opinions on the Kuyprian idea of Christian science diverged greatly. It was, however, among the members of this society that the selection committee had to look for suitable candidates.<sup>24</sup>

An event that complicated matters was the Geelkerken Conflict in the Reformed Churches in the Netherlands, mentioned in the introduction of the paper. In a

<sup>22</sup> *Jaarboek VU* (1926), 98–107; *Jaarboek VU* (1927), 106–27. On the discussion about the foundation of a fourth faculty, see also: Flipse (note 10), 38–42; and Leo van Bergen, *Van Genezen in Geloof tot Geloof in Genezen. De medische faculteit van de Vrije Universiteit 1880–2000* (Diemen, 2005), 173–259.

<sup>23</sup> Minutes 12 May 1927, Curators’ Archives, VU. [‘mensen die uit de ongeloovige wetenschap gedronken hebben en door God bewaard zijn’.]

<sup>24</sup> The Christian Society for Scientists and Physicians (*Christelijke Vereeniging van Natuur- en Geneeskundigen in Nederland*) had existed since 1896. Lectures were organized and a journal was published for the members: the *Orgaan van de Christelijke Vereeniging van Natuur- en Geneeskundigen in Nederland* (1901–1971), hereafter cited as *Orgaan*. See Flipse (note 10), 43–44. For a short history of this Society: Van Bergen (note 22), 93–118.

sermon, the Amsterdam minister Dr J. G. Geelkerken (1879–1960), had voiced doubts about the story of the Fall. This was the occasion for the Synod of the Churches to declare, in 1926, that Chapters 2 and 3 of Genesis should be taken literally. Geelkerken and a few other ministers were suspended. In the Geelkerken controversy, there were divergent opinions on many issues, including Geelkerken's biblical exegesis, the question of whether his suspension by the synod was correct according to ecclesiastical law, and the Calvinist view of the Bible in the general. Although the conflict was primarily ecclesiastical, different opinions on the significance of scientific knowledge played an important role in the background of the conflict, as was suggested by the comparison with the Scopes trial made by the liberal newspaper.<sup>25</sup>

Among the VU professors, there was diversity of opinion: some supported Geelkerken, or thought that the controversy was irrelevant to the functioning of the VU; others—among them the theologians—supported the Synod. The fact that some VU professors were members of the local Reformed parish of which Geelkerken was minister made the controversy even more threatening for the peace at the VU. Despite this discord, in a report that was presented at the annual meeting of 1928 the Society for Higher Education concurred with the point of view advocated by the General Assembly and stated that the Bible should be taken literally when it dealt with history and natural facts. In the future, professors to be appointed had to agree with this report.<sup>26</sup>

In the mean time, the selection committee had made a provisional inventory of suitable candidates, which was discussed by the senate of the VU on 2 November 1928. The committee presented a list of one chemist, seven physicists, and four mathematicians, who were (of course) all of Reformed background and had a doctorate in one of the sciences. They could, however, not yet give much substantive information about the fundamental beliefs of the candidates.<sup>27</sup> In a second report, of 30 November 1928, the committee provided more information about the scientific qualities and the religious beliefs of the candidates. After a meeting of the senate, the committee started interviews and correspondence with some of the candidates.<sup>28</sup> The chemist Jan Coops, an engineering graduate from the Polytechnical School in Delft, who had taken his doctorate in 1924, accepted his nomination and declared that he agreed with the statutory principles of the VU and with the report of 1928 about the literal meaning of Bible passages concerning history and natural facts. Coops's appointment was approved by the boards of curators and directors, and Coops joined the VU as of 2 May 1929.<sup>29</sup>

Finding a physicist and a mathematician, however, led to much trouble. For some of them, especially the physicists, the recent statements of the VU about the literal meaning of Genesis were an obstacle to accept the chairs. Six of the seven physicists—some with considerable standing in physics—were tried and found wanting in the period March–July 1929. Some of them declared that they could

<sup>25</sup> It is remarkable that in the volume *De kwestie-Geelkerken. Een terugblik na 75 jaar* (note 1), which comprises chapters on several aspects of the Geelkerken controversy, the science-and-religion aspect is not discussed separately.

<sup>26</sup> Flipse (note 10), 44–8. 'De Jaarvergadering', in *Jaarboek VU* (1929), 23–31; and 'Rapport-Van Dijk', in *Jaarboek VU* (1928), 120–36.

<sup>27</sup> Minutes 2 November 1928, Senate's Archives, VU.

<sup>28</sup> Minutes 30 November 1928, Senate's Archives, VU.

<sup>29</sup> Minutes 2 November 1928, Senate's Archives; Minutes 16 March 1929, Directors' Archives, VU.

not agree with the policy adopted by the VU after the Geelkerken controversy. One of the candidates wrote in a letter to the committee that, especially since the Geelkerken controversy, 'it has become increasingly clear to me that I cannot subscribe to the prevailing Calvinist view of the Bible'. Another wrote that, because of his ideas about the biblical Creation story—he was not sure that Genesis 1 was meant to teach us the chronology of Creation—he could not agree with the conclusions of the 1928 VU report. Others were dropped by the committee because of their skeptical attitude towards the VU in general.<sup>30</sup> Finally, in August 1929, the last remaining person on the list of physicists was contacted.<sup>31</sup> He was the 28-year-old Gerard Sizoo, then working at the Philips Laboratory in Eindhoven. Three years earlier, he had obtained his PhD at the Kamerlingh Onnes Laboratory in Leiden. It appears that Sizoo, like the other candidates, had some doubts about the prospects for doing physics in the Calvinist context of the VU, but at the same time he felt a strong bond with the ideals of the VU. During his student days at Leiden University, where he was pained by the positivist atmosphere, he had studied the works of Kuyper, Bavinck, and Woltjer, which had inspired him, and had shaped his mind and helped him to find his way in issues of science and religion. After several interviews with the selection committee and some meetings of the curators and directors of the VU, Sizoo was appointed in November 1929.<sup>32</sup> Unlike Coops, Sizoo seems to have had serious doubts about signing the strict guidelines of the 1928 report but finally decided that he saw possibilities for working in line with the basic neo-Calvinist ideas of the founders.<sup>33</sup>

Finding a mathematician again proved to be very difficult. When more information was acquired, some turned out to lack the required scientific qualities, and as a result the procedure never reached the stage of correspondence or interviews with them. Finally, in March 1930, the senate debated a proposal to appoint J. F. Koksma. Koksma, only 26 years old, had graduated at Groningen University and was still working on his PhD. Doubts about the appointment of Koksma were voiced, especially because of his youth and lack of experience. The possibility was considered of abandoning the search for a mathematician and instead looking for a biologist, astronomer, or geologist. However, this turned out to be equally difficult. Moreover, mathematics was considered very important for the curriculum—courses in mathematics were also required for students in chemistry and physics—and mathematical research was cheaper than experimental sciences like biology or geology.<sup>34</sup> Finally, they returned to Koksma, who had meanwhile obtained his PhD (cum laude) in June 1930, and the committee and the senate decided to nominate him. After the nomination had been approved by the other boards of governors of the university (curators and directors), Koksma was appointed in August 1930. Although Koksma subscribed to the principles of the VU, it seems he was not questioned about his

<sup>30</sup> Minutes 19 April 1929; minutes 20 November 1928; curators to senate, 5 July 1929; J.F. Reitsma to senate, 8 July 1929, Senate's Archives. E. Oosterhuis to curators, 4 March 1929; H.R. Woltjer to G.Ch. Aalders, 6 May 1929 ['is het mij hoe langer hoe duidelijker geworden [. . .] dat ik de overheersende Gereformeerde Bijbelbeschouwing niet delen kan']; F.M. Penning to Dijk, 7 May 1929; Penning aan Aalders, 17 May 1929 ['Het is voor mij de vraag of het inderdaad Gods bedoeling is ons hier zekerheid omtrent deze chronologische volgorde te geven'], Curators' Archives.

<sup>31</sup> Minutes 14 September 1929, Curators' Archives, VU.

<sup>32</sup> Minutes 19 October 1929, Directors' Archives, VU.

<sup>33</sup> G.J. Sizoo, 'Na vijfendertig jaar', *Orgaan*, 63 (1965), 253–69, on 257.

<sup>34</sup> Minutes 14 March 1930, Senate's Archives, VU; Blauwendraat (note 19), 77–80.



Figure 2. Founding fathers of the Faculty of Science of the Free University in 1930. Standing: the mathematicians M. van Haaften (left) and J.F. Koksma; sitting: the physicist G.J. Sizoo (left) and the chemist J. Coops.

attitude to the same extent as Coops and Sizoo. It is possible that fewer problems were expected to arise concerning mathematics; in addition the legal deadline left no time to search for other candidates. Besides the three full professors, finally one part-time professor, M. van Haaften (1880–1957), was appointed. He was probably appointed because he was older than Coops (1894–1969), Sizoo (1900–1994), and Koksma (1904–1964), and although he would not give many courses (only a course of actuarial mathematics), his experience could be helpful to the others (Figure 2).<sup>35</sup>

The tasks that Coops, Sizoo, and Koksma were expected to fulfil—taking care of research and teaching in their disciplines and in addition to this reflecting on science-and-religion issues—were very demanding, particularly because of the understaffing: at the state universities, at least two professors and some lecturers were responsible for each discipline. At the VU, lecturers (for chemistry and mathematics) could be

<sup>35</sup> For biographical information on Coops see ‘Inventaris van het archief van prof.dr.ir. Jan Coops (1894–1969)’, Coops’s Archives, HDC. For Sizoo see Flipse (note 10), 52–57; and ‘Enige gegevens betreffende prof.dr. G.J. Sizoo’, Sizoo’s Archives, HDC. On Koksma and Van Haaften see Blauwendraat (note 19), 77–80.

added to the staff only at the end of the 1930s, while more professors were appointed only after the Second World War.

The fourth Faculty was constituted just in time to meet the requirements of the Law on Higher Education, in October 1930, which coincided with several festive meetings on the occasion of the fiftieth anniversary of the VU. The speeches on the occasion of the constitution show great relief that the foundation had been successful, and a hope that finally a Christian science was to be developed. One of the governors spoke of the 'high vocation' of the professors, now that they had joined the VU, in its 'ancient struggle for the principles'.<sup>36</sup> Peace and quiet had been restored, but the laborious search for suitable candidates had also shown that the interpretation of the neo-Calvinist ideal was not univocal in Reformed circles. As a result, the governors had finally arrived at three relatively young, and 'innocent', men who had not yet put forward strong views on tricky issues. Nevertheless, in the Calvinist world, the expectations for the Science Faculty ran high.

Because the young professors wanted to set up new lines of research partly different from the ones they had worked on before, they used the first year to familiarize themselves with the newly chosen subjects and to broaden their knowledge. In January 1930, Coops and Sizoo made a journey to several physical and chemical laboratories in Germany and to Vienna and Prague. Back in Amsterdam, Coops continued his earlier work in the field of thermochemistry. Sizoo chose to work on 'radioactivity' ('nuclear physics' later in the 1930s), which was completely new for him. One reason for choosing this subject was that no other laboratory in the Netherlands was specialized in this subject—although there were several laboratories for radioactivity research in other countries. It was a 'niche' in the field of physical research, and it would supplement the existing research fields. Another important argument was that it seemed to be a relatively cheap subject of research (an expectation that would be belied in the not too distant future). In the spring of 1930, Sizoo visited the famous Kaiser Wilhelm Institute in Berlin to work on radioactivity in the laboratory of Lise Meitner for several months. Koksma, after his appointment, made two study trips to Göttingen, which was then the mathematical centre of the world, to broaden his knowledge of recent developments in mathematics. In Amsterdam, he continued to work on analytic number theory.<sup>37</sup>

With money that had been raised by the supporters in the preceding years—more than 400,000 guilders—a new laboratory was built which could house chemistry, physics, and mathematics. Initially, the new disciplines were temporarily accommodated at various places in town, e.g. in old school buildings and shop premises. In spite of this, in the first few years several students enrolled, and a number of courses were given. In March 1933, the newly built laboratory was opened (Figure 3). Research was extended from then on, more and more courses were given, and one student graduated as early as October 1933; he had started his studies at another university and switched to the VU in 1930 'in order to finish my study in a principled

<sup>36</sup> J.C. Rullman, *De Vrije Universiteit. Haar ontstaan en haar bestaan*, Amsterdam, 1930, 179; *Gedenkboek van de viering van het 50-jarig bestaan der Vrije Universiteit te Amsterdam op 20–22 October 1930* (Kampen, 1931), 168. ['onze ouden trouwen strijd [. . .] voor het beginsel'.]

<sup>37</sup> On Coops's research, see Velthorst and De Boer (note 19), 155–58. On Sizoo's research, see Flipse (note 10), 58–68; and Abraham Pais, *Nuclear Physics in the Netherlands, the Early Years. Lecture given on November 22, 1990* (Amsterdam, 1990), 21–31. On Koksma, see Blauwendraat (note 19), 87–88.





Figure 3. Newly built laboratory for chemistry and physics of the VU in the 1930s: ‘This beautiful building, that shows the love and the spirit of sacrifice of the Calvinist people for their own University’, [‘Dit schone bouwwerk, [dat tot velen] de sprake [doet] uitgaan van de liefde en offervaardigheid van het Gereformeerde volksdeel voor de instandhouding van een eigen inrichting van Hooger Onderwijs’].

way’, as he wrote.<sup>38</sup> Many were to follow, and in 1939 the number of registered students had increased to 106. Initially, the students were referred for some courses to the municipal University of Amsterdam, which also offered science courses. By the end of the 1930s, however, all the courses for a doctoral degree in mathematics, physics, or chemistry were conducted at the VU.<sup>39</sup>

Despite this isolationist tendency in the area of teaching, the professors soon joined in with their fellow scientists at other universities: they took an active part in the scientific societies of the Netherlands, they published in scientific journals, and sometimes their research was done in close collaboration with other laboratories. In 1936, Koksma published a book on *Diophantische Approximationen*, which brought him an international reputation in his discipline. Likewise, the curricula—courses and practicals—were modelled on the curricula of the other universities.<sup>40</sup>

One of the remarkable aspects of this initial period is that the fields of research were chosen almost without serious discussion about the possible religious consequences of the research. While, during the selection procedure, the candidates

<sup>38</sup> H. Turkstra to G.J. Sizoo, 18 June 1930, Physics VU Archives, HDC. [voor ‘principieele beëindiging mijner studie’.]

<sup>39</sup> Flipse (note 10), 68, 81.

<sup>40</sup> Flipse (note 10), 69–73, 83–88; Blauwendraat (note 19), 107–9.

had been pestered with questions about their beliefs, they now seemed to have carte blanche, as long as their plans did not turn out to be too expensive. Important arguments for the new professors to choose a research subject were their own scientific skills and the scientific prospects. Their orientation towards other national and international laboratories shows that in their view, the Christian science that was to be developed could not be entirely detached from existing (secular) science. From the start, the faculty tried to establish contacts with other universities, while at the same time adopting its own course and trying to be independent, despite the understaffing and lack of money. As a result, notwithstanding the initial scepticism about the initiative of the VU, in the course of the 1930s the VU Science Faculty became an accepted part of the Dutch scientific world. The research conducted at the VU was included and judged positively in various surveys of Dutch scientific research published around 1940.<sup>41</sup> It seems, however, that mainstream scientists did not react to the VU conceptions of a Christian science.

#### 4. The Calvinist scientists on science-and-religion issues

Although, scientifically, the faculty was doing well, for the majority of VU sympathizers the most important criterion for the faculty being a success was whether the new professors would be able to work in accordance with the Christian character of the VU, in other words, would they build their science on the basis of Calvinist principles, and would this lead to a real alternative for mainstream science? In this section, the ideas of Coops, Sizoo, and Koksma on this subject are considered in greater detail.

The three professors were expected to cultivate their views on science-religion issues and account for it to their VU colleagues, their students, and the Society for Higher Education. At the annual meeting of the Society of 1930, Coops delivered a speech about 'Christian Science', and Sizoo spoke about the 'Importance and Perspectives of the Faculty of Science' (Koksma had not yet been appointed at the time of this meeting).<sup>42</sup> Coops spoke in a very general way about the concept of a Christian science, mostly echoing the general sentiments of the founders of the university. It was not true, he told his audience, that science and religion had nothing to do with each other or that only the 'exact sciences' could give us certain knowledge. Every science, Coops contended, is based on philosophical foundations, and it must be possible to choose foundations that are not at variance with Holy Scripture.<sup>43</sup> Sizoo was more precise about his ideas and developed a kind of programme for the faculty. He argued first that, instead of accepting a conflict between science and religion, one should realize that all aspects of life are subject to Christ and that Christians need not turn their back on science, but actually have a mission to be engaged in science. The new faculty would have the task of fighting against the idea of an unavoidable conflict between science and religion. Then, he

<sup>41</sup> See e.g. *Natuurwetenschappelijk onderzoek in Nederland. Een overzicht van hetgeen in de laatste vijf jaar in Nederland verricht is op het gebied der natuurwetenschappen, der medische en der technische wetenschappen* (Amsterdam, 1942), 18–19, 51, 243, 246; *Geestelijke Nederland 1920–1940*, edited by K.F. Proost and Jan Romein, 2 vols (Amsterdam, 1948), II, 226–27, 241, 273–76.

<sup>42</sup> J. Coops, 'Christelijke Natuurwetenschap', and G.J. Sizoo, 'Beteekenis en perspectieven der Wis- en Natuurkundige Faculteit', in *Redevoeringen, uitgesproken op de jaarvergadering der Vereeniging voor Hooger Onderwijs op Gereformeerden Grondslag* (Amsterdam, 1930).

<sup>43</sup> J. Coops (note 42), 1–7.

focused on the content of science, and remarkably he admitted that, in his opinion, faith would not directly influence scientific practice (i.e. methods and theories) at the new faculty. He stated that the Calvinist principles should sometimes have a corrective function while interpreting results, but he did not give examples of situations where this might be necessary. He went on to speak about philosophy of nature. According to Sizoo, an important task for the new faculty would be to develop a Christian ‘natural philosophy’, preferably in cooperation with the Faculty of Theology of the VU. In this field, the principles were of overriding importance. Finally, Sizoo spoke about teaching in the new Faculty. As in research, in teaching there would not be much difference as far as the content of the courses in chemistry, physics, and mathematics was concerned. However, there might be a difference in ‘atmosphere’, which would be an ‘atmosphere of worship’ instead of the ‘materialistic atmosphere’ at other universities.<sup>44</sup> This ideal of Sizoo was underlined by the words that were written over the door of the new laboratory, for everyone who entered to read: ‘Thou art worthy, O Lord, to receive glory and honour and power: for thou hast created all things, and for thy pleasure they are and were created’ (Revelation 4:11). These words placed the work that was done in the laboratory in the broader perspective of the service of the Lord.<sup>45</sup>

Here we have a first inkling of the extent to which the new professors were able to apply the neo-Calvinist body of thought in practice. In a certain sense, their ideas and activities can be seen as a continuation and elaboration of the neo-Calvinist programme for the domain of the sciences. This is mainly true with respect to their attitude to modern life in general: they combined orthodox-Christian convictions with a strong engagement in modern culture. Man should seek God’s glory in ‘the whole domain of human existence’. In this, they also stimulated the emancipation of the *kleine luyden* in science, as had happened earlier on in other areas of society. Although the content of science would not be influenced by faith, this influence should be effective in other ways. According to Sizoo, for example, religion should influence the ‘atmosphere’ in the laboratory.

In practice, it is of course very difficult to create an atmosphere on purpose. However, because the professors and the students were all from the same, Calvinist, background, the atmosphere at the faculty differed in fact from that at the State Universities. This atmosphere was manifest in the prayers with which the first courses of the day were started and the general attitude in which it was accepted to be an orthodox Christian, an atmosphere of ‘like knows like’.<sup>46</sup>

Besides this atmosphere, several issues of scientific and philosophical importance were dealt with. Sizoo was the one who most explicitly confronted science with religion in numerous substantive papers and speeches, and in some books. He was familiar with the neo-Calvinist ideas about science and frequently referred to Kuyper, Bavinck, and Woltjer to defend his opinion. Three topics that are present in his work stand out: radioactivity and the age of the Earth, natural philosophical

<sup>44</sup> G.J. Sizoo (note 42), 8–19, esp. 17. [een ‘sfeer der aanbidding’]

<sup>45</sup> J. Coops and G.J. Sizoo, ‘De wandversiering in het natuurkundig en scheikundig laboratorium der Vrije Universiteit’, in *Almanak van het studentcorps aan de Vrije Universiteit* (Amsterdam, 1934), 144–51. [‘Gij Heere, zijt waardig te ontvangen de heerlijkheid en de eer en de kracht; want Gij hebt alle dingen geschapen, en door Uwen Wil zijn zij en zijn zij geschapen.’]

<sup>46</sup> Blauwendraat (note 19), 117, 194–95; Brigitte Herz and Ida H. Stamhuis, ‘To be a female student of science at a Calvinist University, 1930–1960’, in *Women Scholars and Institutions. Proceedings of the International Conference*, Prague, 8–11 June 2003, 115–57, on 132–34.

issues, and history of science. A review of Sizoo's discussions about these topics—and of Koksma's ideas about the foundations of mathematics—will show to what extent the programme, as developed in Sizoo's 1930 speech 'Importance and perspectives', was realized during the first ten years of the existence of the faculty.

#### 4.1. *Radioactivity and the age of the Earth*

As we saw, Sizoo accepted the autonomy of the methods and theories of contemporary physics in principle. Consequently, the research that was conducted at the VU conformed to the research done in international physics in the 1930s. This was rarely a problem, because the very technical research on radioactivity and the atomic nucleus appeared to have no obvious links to faith. There was, however, one important exception: radioactivity can be used for determining the age of the Earth, and this was an issue that Sizoo also dealt with in a course of his lectures.<sup>47</sup> It is interesting to explore his ideas about this topic, in which scientific results easily seem to conflict with the truths of faith. In 1933, Sizoo wrote a non-specialist book on *Radioactiviteit* (Radioactivity), dealing with the phenomenon of radioactivity and the methods of physics used to explore it. In the last chapter, he discussed some methods to determine the ages of rocks and strata, and finally he stated that 'we cannot avoid the conclusion that the Earth is millions of years old', which was evidently more than the 6000 years still accepted by the majority of Calvinists. Thereafter he made an explicit link to faith, when he said that these results might give rise to a reinterpretation of Scripture.<sup>48</sup> This example shows again that Sizoo ascribed a certain independence to the scientific results and that he had no intention of subordinating physics completely to faith when he was sure about the factuality of empirical data. In this context, he referred to Woltjer and argued that these results form part of the area where 'nature itself teaches us', the expression used by Woltjer when discussing Lorentz's electron theory.<sup>49</sup>

Nevertheless, it is remarkable that Sizoo raised this tricky business so soon, considering the commotion surrounding the appointment of professors following the Geelkerken controversy. It seems, however, that the careful way in which he presented his view prevented an uproar arising among the VU sympathizers. Before Sizoo decided to publish his book, he had contacted one of the moderate theologians of the VU, C. van Gelderen (1872–1945). The latter had supported his position and suggested that Sizoo write the book in such a way that he did not lose the trust of the Calvinist supporters. And it worked out well: the book was positively received by the Calvinist press.<sup>50</sup> Apart from this short meeting of Sizoo and Van Gelderen, contacts between the scientists and the theologians did not proceed smoothly in the 1930s. Most theologians continued to work in line with the decisions of the 1926 Synod; they insouciantly ignored scientific results and were more and more inclined towards a kind of Biblicism. The theologian G. Ch. Aalders (1880–1961), for example, wrote a book about 'The divine revelation in the first three chapters of Genesis' in which he more or less tried to combine scientific data with an only slightly adapted exegesis of Genesis: he defended the idea that the age of mankind since Adam and Eve was at most 15,000 years and that the six days of the creation could be interpreted as longish

<sup>47</sup> See e.g. the 'Overzicht colleges met behandelde onderwerpen', in *Jaarboek VU* (1934), 64.

<sup>48</sup> G.J. Sizoo, *Radioactiviteit* (Kampen, 1933), 183–206, esp. 195–96.

<sup>49</sup> G.J. Sizoo (note 48), 183; G.J. Sizoo (note 42), 14.

<sup>50</sup> 'Interview prof. dr. G.J. Sizoo', June 1987, Sizoo's Archives, HDC; G.J. Sizoo (note 33), 257.

periods.<sup>51</sup> In his book on Radioactivity, Sizoo refers to Aalders' book as an example of how one can solve the problems that arise when the biblical story of the creation is confronted with the scientific data. In the following years, however, Sizoo gradually lost confidence in this approach.<sup>52</sup> However, no public debate about the age of the Earth in relation to the biblical creation story was started after publication of the books by Sizoo and Aalders. It was not until 1950 that a conference about 'the age of the Earth' was organized for Reformed scientists, on Sizoo's initiative, the lectures of which were subsequently published. As a sequel to this congress, the discussion between Reformed theologians and scientists on creation issues finally got off the ground.<sup>53</sup>

#### 4.2. *Natural philosophy: 'self-criticism of physics' and causality*

In addition to initiating the debate on the age of the Earth Sizoo wrote a great deal on natural philosophy, in particular the philosophy of physics. In his discussions of relevant topics like causality and determinism, physics and reality, and laws of nature, there is one theme that returns time and again: contemporary physics, he seems to say, is already less materialistic than nineteenth-century physics. The modernistic overestimation of science was a thing of the past, which was partly due to internal developments in physics: it was a matter of 'self-criticism' within physics.<sup>54</sup> As an example of this self-criticism, Sizoo mentioned Einstein's relativity theory which criticized the concept of simultaneity in classical physics. Another example of this self-criticism was that the deterministic interpretation of causality, used in classical physics, had been replaced in quantum mechanics by the concept of probabilistic causality. This was apparent, for example, in the study of radioactive decay, which follows probabilistic laws. While in the nineteenth century Christians sometimes had to fight against an overestimation of the compelling strength of determinism, the new concept of causality appeared to conform better to the Christian worldview. Now that nature appeared to be not completely determined by physical laws as a 'closed system', there seemed to be more room for religion, e.g. for prayer and belief in God's providence, Sizoo suggested, although not committing himself fully to these ideas. He especially stressed that quantum mechanics and other new theories showed that God's creation was more mysterious than was imagined by nineteenth-century materialists.<sup>55</sup>

Sizoo observed that a broader movement of reflection on the foundations of physics had emerged, leading sometimes to new ideas about the relations between science, worldview, and religion. In this context, he referred to the book by the German physicist Bernhard Bavink *Die Naturwissenschaft auf dem Wege zur Religion* (Science on the way to religion, 1933) in which the author stated that the new physics—in contrast to classical physics—was in harmony with religion. This was not exactly Sizoo's own opinion—in Sizoo's view, religion was not dependent on a newer

<sup>51</sup> G.Ch. Aalders, *De Goddelijke Openbaring in de eerste drie hoofdstukken van Genesis* (Kampen, 1932), 252–63, 318–27.

<sup>52</sup> Sizoo (note 48), 195–96. Sizoo (note 33), 257–58.

<sup>53</sup> *De ouderdom der aarde*, edited by G.J. Sizoo (Kampen, 1955, 4th reprint); Flipse (note 10), 165–7; Stellingwerff, *De Vrije Universiteit na Kuyper. De Vrije Universiteit van 1905 tot 1955, een halve eeuw geestesgeschiedenis van een civitas academia* (Kampen, 1987), 366–76.

<sup>54</sup> G.J. Sizoo, 'Zelfcritiek der physica', in *Almanak van het studentencorps aan de Vrije Universiteit* (Amsterdam, 1931), 182–90.

<sup>55</sup> See e.g. G.J. Sizoo, 'Causaliteit en waarschijnlijkheid in de nieuwere physica', *Orgaan*, 32 (1932), 1–24; G.J. Sizoo (note 48), 167–83.

or older scientific theory—but books like this showed the wind of change blowing through the scientific world, which was in general judged positively by Sizoo.<sup>56</sup>

#### 4.3. *Natural philosophy: science and reality*

Considered even more important than questions about the causality of nature was the epistemological question of the character of scientific knowledge. Recent developments in physics had shed new light on this issue. In quantum mechanics, it turned out to be ambiguous to conceive of the world as a physical reality independent of the observer. These developments, together with renewed instrumentalist and conventionalist tendencies in philosophy, resulted in questions about the role of the subject and the objectivity of the world. Sizoo would go his own way in this discussion and expatiated on the subject in several speeches, among which was ‘Ernst Mach’s positivism and the development of modern physics’, a speech delivered on 20 October 1937, the beginning of the academic year in which Sizoo was Rector Magnificus, and ‘Science and reality’, delivered at the annual meeting of 1940. In the first speech he argued against the ideas of Ernst Mach and Pascual Jordan, saying that their arguments against the reality of scientific objects and laws were unconvincing and should be rejected. In Sizoo’s view, scientific knowledge was more than a useful instrument to classify observations. This was an erroneous conception of science which did not recognize the role of presuppositions. Moreover, this pragmatic motive for doing science, in which science was only characterized by its usefulness for mankind to control the environment, should be disqualified as evolutionistic and dangerous, because it could easily lead to abuse of scientific knowledge. According to Sizoo, physical knowledge was the result of the interaction of subject and object: the logical activity of mankind matched with the logical structure of reality. The interpretation and evaluation of scientific knowledge should always be preceded by presuppositions about reality. And it was these presuppositions, about the order, reality, and harmony of creation, in which religious convictions play a role. We can therefore be assured that our knowledge, within certain limitations, is genuine knowledge of the real world. Placing himself in the Kuyperian tradition, Sizoo stated that we should acknowledge ‘the Sovereignty of God in the whole domain of our human existence’. And he ended his speech by saying that the final aim of science is ‘the glory of God’.<sup>57</sup>

In this way, Sizoo had taken the initiative for further reflection. The question now arose whether, in this area, a fruitful cooperation might develop with the theologians. However, it became clear fairly soon that this was a vain hope. In the same period when Sizoo put forward these and similar ideas about the status of scientific knowledge, the VU theologian V. Hepp (1879–1950) advocated a different view. In his lectures on ‘Calvinism and the philosophy of Nature’ (1930), which he delivered at Princeton (where Kuyper and Bavinck had earlier delivered their lectures), he was also very skeptical about the positivistic view of scientific knowledge. Against this view, which pretended to develop a science without principles, only based on inductive methods, Hepp proposed his own alternative view of scientific knowledge,

<sup>56</sup> As is apparent from several lectures by Sizoo in the 1930s: file ‘Voordrachten, toespraken, enz’, Sizoo’s Archives, HDC.

<sup>57</sup> G.J. Sizoo, ‘Het positivisme van Ernst Mach en de ontwikkeling der moderne physica. Rede uitgesproken ter gelegenheid van den dies natalis der Vrije Universiteit op 20 October 1937’, *Orgaan*, 37 (1937), 113–48; G.J. Sizoo, *Physica en werkelijkheid. Referaat wetenschappelijke samenkomst der Vrije Universiteit. 10 juli 1940* (Amsterdam, 1940).

which can be described as ‘deductive science’. His starting point ‘why should not Calvinism have just as much right to set up an hypothesis as the unbelieving philosophy of nature?’ resulted in very speculative ideas about topics such as the (young) age of the Earth, the (variable) velocity of light, and catastrophes that are responsible for most of the geological data.<sup>58</sup> Sizoo did not react in public, but later he declared that he was shocked by Hepp’s lectures, which were published in May 1930, shortly after Sizoo’s appointment: ‘If this should be called Calvinist natural philosophy [...] doubts about the future of the new science faculty were completely justified’.<sup>59</sup> According to Sizoo, Hepp did not properly value the experimental side of science and the significance of scientific knowledge. These diverging ideas of the theologian on the one hand and Sizoo on the other are again a signal of the strained relation between scientists and theologians in Reformed circles of those days.<sup>60</sup>

#### 4.4. *History of science as an eye opener*

In the 1930s, Sizoo gave several lectures on the history of science. During his student days, it had been an eye opener for him that many scientists of the past were Christians. This stimulated him to explore certain aspects of the relationship of science and religion in the past. Once he was a professor, he lectured on ‘fragments from the history of the relation between science and religion’ for the Student Society of the new faculty. Sizoo stressed that, in the past, many scientists, such as Kepler, Newton, and Maxwell, had seen reasons in the results of their research to praise God’s greatness and wisdom. Only in the second half of the nineteenth century had the sciences been monopolized by the materialists and become a bastion of unbelief. Orthodox Christians had begun to turn their back on the questions at hand. This was contrary to the earlier Christian tradition, especially the protestant tradition, in which the study of nature had always had a prominent place. The metaphor of the ‘Two Books’ had stimulated this attitude: God reveals Himself through the book of Scripture, as well as through the book of Nature. Christian belief therefore stimulates the study of nature, and Christians have to take the study of nature very seriously, Sizoo taught his students.<sup>61</sup> Sizoo hoped that closer study of the history of science could help to clarify the contemporary tensions in the relation between science and religion. Sizoo was not alone in this approach. In reaction to the warfare model of science and religion, a wide interest in religious scientists of former times had developed.<sup>62</sup>

<sup>58</sup> V. Hepp, *Calvinism and the Philosophy of Nature. The Stone Lectures Delivered at Princeton in 1930* (Grand Rapids, 1930), 181, 200–1, 216–20.

<sup>59</sup> G.J. Sizoo (note 33), 256. [‘Indien dit calvinistische natuurphilosophie zou moeten heten [...] dan was de twijfel ten aanzien van haar toekomst [...] ten volle gerechtvaardigd.’]

<sup>60</sup> A devastating review of Hepp’s lectures was given by another member of the Christian Society for Scientists and Physicians: W.J.A. Schouten, ‘Calvinisme en Natuurphilosophie (Een beoordeling van prof. Hepp’s Stone-lectures)’, *Orgaan*, 31 (1931), 51–81. On the laborious relation between scientists and theologians see Stellingwerff (note 53), 145–58.

<sup>61</sup> G.J. Sizoo, ‘Fragmenten uit de geschiedenis der betrekking tusschen Natuurwetenschap en Religie’, *Orgaan*, 37 (1937), 1–21; and several lectures that are preserved in the Sizoo’s Archives, HDC.

<sup>62</sup> On the historiography of science and religion in the early twentieth century, see David B. Wilson, ‘The Historiography of Science and Religion’, in *Science and Religion. A Historical Introduction*, edited by Gary B. Ferngren (Baltimore, MD, 2002), 13–30, on 16–9; and Frederick Gregory, ‘Science and Religion’, in *From Natural Philosophy to the Sciences. Writing the History of Nineteenth-Century Science*, edited by David Cahan (Chicago, 2003), 329–58, on 336–40. On the fascination with religious scientists of the past in the period 1880–1920, see Nicolaas A. Rupke, ‘Introduction: Telling Lives in Science and Religion’, in *Eminent Lives in Twentieth-Century Science and Religion*, edited by Nicolaas A. Rupke (Frankfurt am Main, 2007), 13–45, esp. 16–21.

In the Christian Society for Scientists and Physicians, Sizoo became acquainted with Reijer Hooykaas. In 1933, Hooykaas had defended a dissertation entitled *Het begrip element in zijn historisch-wijsgeerige ontwikkeling* (The concept of element in its historical-philosophical development) in Utrecht. Hooykaas (1906–1994), who had studied chemistry, became one of the pioneers in the history of science in the Netherlands—alongside E. J. Dijksterhuis, who had begun to publish on the history of science in the 1920s. At the annual meeting of the Society for Higher Education of 1934, Hooykaas—at the invitation of Sizoo—lectured on *Natuurwetenschap en religie in het licht der historie* (Science and religion in the light of history). In the following years, Hooykaas conducted the study of the history of science in the spare time left by his job as a high-school teacher. In the journal of the Christian Society, he published articles on Kepler's concept of hypothesis, Pascal's science and religion, and a lengthy study of Robert Boyle.<sup>63</sup>

Sizoo became more and more convinced that professional study of the history of science could be of special importance for the clarification of the science-and-religion debate. In 1945, he persuaded the governors of the VU to establish a chair for the history of science in the Science Faculty. Hooykaas was appointed, initially part time, and from 1948 as full-time professor. The VU was the first university in the Netherlands with a chair for the history of science. Only in 1953 Dijksterhuis was appointed professor of the history of the exact sciences in Utrecht.<sup>64</sup>

After his appointment, Hooykaas continued to pay special attention to the relation between science and religion in his study of the history of science. He published in the journal of the Christian Society and other Calvinist and non-Calvinist Dutch periodicals, but increasingly he lectured and published in English. In his *Religion and the Rise of Modern Science*, he studied in depth the role of Protestantism in the birth of classical modern science. He argued that the 'biblical worldview' formed an important ingredient of the new science, because in the Bible 'nature is not a deity to be feared and worshiped, but a work of God to be admired, studied and managed'.<sup>65</sup>

It is interesting to note that the Calvinist ideas about science led to a specific view of the history of science, which is diametrically opposed to the warfare thesis of the nineteenth-century naturalists. Hooykaas's studies can, however, not be disqualified as mere apologetics, as he followed his own path as a historian of science in the Calvinist world (sometimes being very critical of the Calvinist

<sup>63</sup> Examples of Hooykaas's papers in this early period: R. Hooykaas, *Natuurwetenschap en religie in het licht der historie. Referaat voor de negentiende Wetenschappelijke samenkomst der Vrije Universiteit op 4 Juli 1934* (Assen, 1934); R. Hooykaas, 'Het hypotheesbegrip van Kepler', *Orgaan*, 39 (1939), 38–59; R. Hooykaas, 'Pascal. Zijn wetenschap en zijn religie', *Orgaan*, 39 (1939), 147–78; R. Hooykaas, 'Robert Boyle. Een studie over natuurwetenschap en Christendom', *Orgaan*, 42 (1942) (special issue). Both the Pascal and the Boyle studies have been translated into English: 'Pascal: His Science and His Religion', translation by H.F. Cohen, *Tractrix Yearbook for the History of Science, Medicine, Technology and Mathematics*, 1 (1989), 115–39; and *Robert Boyle: A Study in Science and Christian Belief*, translation by H. van Dyke (Lanham, 1997).

<sup>64</sup> 'Memorandum betreffende de Wis- en Natuurkundige Faculteit', Faculty of Sciences to curators, 16 July 1945, Curators' Archives, VU. On the late appointment of Dijksterhuis: Klaas van Berkel, *Dijksterhuis. Een biografie* (Amsterdam 1996), esp. 309–31, 383–85, 420–30.

<sup>65</sup> R. Hooykaas, *Religion and the Rise of Modern Science*, 1st ed. 1972 (Edinburgh, 1984), 9.



theologians), and his research concerns a broad spectrum of topics in the history of science.<sup>66</sup>

It was one of the peculiarities in the teaching programme of the faculty that all students were required to attend Hooykaas's history of science courses, in addition to philosophy courses given by the philosophers of the VU. Students could also select history of science as a subsidiary subject. Apart from these two extra courses, the curriculum did not differ essentially from the programme at other universities.

#### 4.5. *Religion and the philosophy of mathematics*

Although Sizoo was the one who most thoroughly studied the possible consequences for science of the Calvinist ideals, his colleague Koksma also lectured on issues concerning the relation of faith and his specialty, mathematics. To understand Koksma's ideas about the philosophy of mathematics, it is necessary to know something about the 'foundational crisis' in mathematics in the early twentieth century. In this period, mathematicians were more or less divided into various schools of thought about questions concerning the foundations of mathematics. The most important of these schools were logicism, formalism, and intuitionism, with different ideas about the character of mathematical knowledge. The Dutch mathematician L. E. J. Brouwer was an internationally known champion of intuitionism. Against logicians—who were of the opinion that mathematics is rooted in logic—and formalists—who considered mathematics as an internally consistent formal language, built on more or less arbitrary axioms—he defended the idea that mathematical objects are constructions of the mind and that, therefore, the existence of an object is equivalent to the possibility of its mental construction. It turned out, however, that a consistent application of the intuitionist approach to mathematics had far-reaching consequences, such as rejection of the so-called principle of the excluded middle, which is a frequently used rule in mathematical analysis. As a result, the intuitionistic approach to mathematics was controversial.<sup>67</sup>

In 1918, the Calvinist philosopher D. H. Th. Vollenhoven (1892–1978) had written a dissertation on 'the philosophy of mathematics from a theistic perspective'. In this thesis, Vollenhoven had adopted a Christianized version of Brouwer's intuitionism. As from the late 1920s, Vollenhoven, together with H. Dooyeweerd (1894–1977), another Calvinist philosopher at the VU, started to develop a complete 'Calvinist philosophy',

<sup>66</sup> For Hooykaas as a (Christian) historian of science see H. Floris Cohen 'Eloge: Reijer Hooykaas, 1 August 1906–4 January 1994', *Isis*, 89 (1998), 181–84; and Arie Leegwater, 'In memoriam. Reijer Hooykaas (1906–1994): A Modern Advocate for *Philosophia Libera*', *Perspectives on Science and Christian Faith*, 48 (1996–1994), 98–103. In their discussion of the 'conflict' and 'harmony' theses, Lindberg and Numbers describe Hooykaas, however, as a protestant apologist: *God and Nature. Historical Essays on the Encounter between Christianity and Science*, edited by David C. Lindberg and Ronald L. Numbers (Berkeley, 1986), 1–18, on 5; and Lindberg and Numbers, 'Beyond War and Peace: A Reappraisal of the Encounter between Christianity and Science', *Church History*, 55 (1986), 338–54, on 353. For an example of Hooykaas's fierce criticism of Calvinist theologians and ministers: R. Hooykaas, 'Dominees en evolutie', *Bezinning. Gereformeerd maandblad tot bewaring en bevordering van het christelijke leven*, 5 (1950), 74–88. For the emergence of the history of science as an academic discipline against the background of the science–religion debate, compare Bowler (note 3), 80–86, esp. 86.

<sup>67</sup> On the foundational crisis in mathematics and Brouwer's intuitionism: D. van Dalen, *Mystic, Geometer, and Intuitionist: The Life of L.E.J. Brouwer Part I. The Dawning Revolution* (Oxford, 1999), 99–111, 234–43, 312–30; Blauwendraat (note 19), 42–51.

which included the intuitionist approach to mathematics.<sup>68</sup> As the first mathematician at the VU, Koksma was expected to shed his light on Vollenhoven's ideas. In some lectures, it really did seem that Koksma sympathized with Vollenhoven's theistic intuitionism. He praised the philosophical orientation of the intuitionists in general and agreed with their view that the ultimate goal of mathematics is the truth.<sup>69</sup> However, in practice—in his courses and research—Koksma did not draw the far-reaching consequences implied in intuitionism, and instead appeared to adopt a formalist approach to mathematics. Despite the fact that, at the beginning of his professorship, Koksma looked forward to a fruitful contact with Vollenhoven, no concrete results of cooperation can be found.<sup>70</sup> It appears that not only was the contact with the theologians strained, as we saw above, but the presence of philosophers and scientists in the same university did not lead to cooperation either. It is not completely clear why the cooperation with the philosophers did not get off the ground, but it seems that the very abstract reasoning of the philosophers was one of the causes.

Although the VU scientists were all convinced that science and religion were to be joined in a synthesis, besides the attempts of Sizoo and Koksma to arrive at a kind of integration of science and religion at the level of philosophy and the foundations of physics and mathematics, few results of an exclusive Christian science can be boasted of. Coops, although he was probably the most conservative of the three, was not active in these philosophical discussions. Being an engineer, he appears to have considered his discipline, chemistry, more as a 'trade' than a challenge to faith at the level of a worldview.<sup>71</sup> More than the chemists, the mathematicians and physicists of the early twentieth century were aware of the foundational and epistemological questions involved in their discipline. When reflecting on science and religion, both Sizoo and Koksma adopted ideas from prevailing philosophical discussions, which they integrated in their theistic world view. In practice, however, their scientific research remained separate from their philosophical and religious beliefs. The neo-Calvinist idea of the unity of the sciences all sprouting from the same Christian principles turned out to be difficult to implement in practice; all the more since the collaboration with the theologians and philosophers was frustrated.

### 5. The role of the scientists in the Calvinist subculture

In the course of the 1930s, the Science Faculty gradually earned its place in the Dutch academic world. At least as important for the success of the enterprise was the question as to whether the faculty managed to become an integral part of the

<sup>68</sup> Blauwendraat (note 19), 113–15, 53–61; Van Deursen (note 10), 163–70; Dirk Hendrik Theodoor Vollenhoven, *De Wijsbegeerte der Wiskunde van theïstisch standpunt* (Amsterdam, 1918). Vollenhoven and Dooyeweerd held chairs at the VU as from 1926; their Calvinist philosophy is commonly known as the *Wijsbegeerte der Wetsidee* (Philosophy of the Cosmonomic Idea). See Heslam (note 5), 7, 168, also for references.

<sup>69</sup> J.F. Koksma, *Wiskunde en waarheid. Referaat voor de een-en-twintigste Wetenschappelijke Samenkomst der Vrije Universiteit op 1 Juli 1936* (Assen, 1936); J.F. Koksma, *Existentiebewijzen in de wiskunde. Rede ter gelegenheid van de 58<sup>e</sup> herdenking van de stichting der Vrije Universiteit op 20 October 1938* (Loosduinen, 1938), 39.

<sup>70</sup> Van Deursen (note 10), 179.

<sup>71</sup> For Coops's 'experimental attitude', see 'Dr.ir. J. Coops. Herdenkingscollege op 25 oktober 1969 uitgesproken door Prof. dr. F. Bickelhaupt en Prof. dr. C.C. Jonker', in *Jaarboek VU* (1969), 60–74, esp. 63.

Calvinist subculture. To achieve this, the science professors addressed meetings of ordinary Calvinist church-goers, who were the natural supporters of the university. They used their speeches, delivered in churches and meeting halls throughout the country in the course of the 1930s, to remove the prejudices against the sciences that still lingered. They explained that it had always been the aim of Kuyper to establish a complete university, and moreover it was a Christian vocation to glorify God in all areas of life, including the sciences. Although the situation in the academic world had improved since the late nineteenth century, when secular science was very offensive to orthodox-Christian belief, a Christian Faculty of Science was still indispensable, they claimed.<sup>72</sup> So, while trying to enlarge the social basis for the faculty in the Calvinist world, on the one hand they painted a picture of the prevailing sciences that contrasted with nineteenth century materialism; on the other hand, they stressed the importance of a Calvinist Science Faculty that could show the way in the new scientific and philosophical landscape. Besides the presentations at these propaganda evenings, the professors visited people at home to convince them of the importance of the faculty. Excursions to the laboratory were also organized for interested people.<sup>73</sup>

Although the sympathizers had sometimes been very critical about ideas put forward by ‘their’ professors (which had been the case around the Geelkerken controversy), it turned out that they were well disposed to the scientists. Coops, Sizoo, and Koksma took their time with the meetings with sympathizers, and this gave them an excellent opportunity to advocate their opinion about science and religion to their fellow-believers. Even their ideas about the relative autonomy of the sciences (including Sizoo’s opinion about the (old) age of the Earth) were faced with remarkably little opposition.

In the 1930s, however, the scientists were not representative of all the Calvinist academics, most of whom were holding on more strictly to Kuyper’s heritage. Sizoo, Coops, and Koksma deviated from the course of the theologians who, as we saw, advocated a more direct relation between Calvinist principles and the content of science. These differences between the theologians on the one hand and the scientists on the other had already played a role in the Geelkerken controversy and during the selection procedure, and they continued to exist until the 1950s. As a result of this alienation between scientists and theologians, many controversial issues concerning the relation between science and religion were only discussed among scientists in the relative seclusion of the Christian Society for Scientists and Physicians. Although the lectures were published in the journal of the Society, the discussions did not cater to a broad public. It was here that the theory of evolution was discussed at length in the 1920s and 1930s, a discussion that started in the rest of the Calvinist world only in the 1950s.<sup>74</sup> The VU scientists were part of both this community of Calvinist scientists and physicians and of the VU community, only the latter having strong ties with the grass root Calvinists.

Because there was no public debate, everything seemed quiet and calm in the Calvinist world after the Geelkerken controversy had been settled. This image of a very conservative subculture in which the only concern was to consolidate the

<sup>72</sup> Based on several speeches of Sizoo that have been preserved in the Sizoo’s Archives, HDC. Coops and Koksma delivered similar speeches.

<sup>73</sup> For a report of such an excursion, see *VU-blad* (1932–1933), 78–9.

<sup>74</sup> R.P.W. Visser (note 15), 116–27.

legacy of Kuyper, Bavinck, and other ‘great men’, has long been maintained by scholars writing about the history of the Dutch Calvinists in the interwar period.<sup>75</sup> It should be stressed, however, that at the same time several movements of renewal were active in the Calvinist world, springing from a new mentality—which was part of a broader cultural climate—that voiced doubts about the infallibility of the tradition. In very different ways, these renewers—among whom were the philosophers of the VU, Vollenhoven and Dooyeweerd, who were developing their Calvinist philosophy—tried to respond to the questions of the age starting from their own tradition, all the while attempting to cope with modernity in novel ways.<sup>76</sup> The scientists of the VU appear to be a part of this movement of renewers. However, it is remarkable that there seems to have been barely any contact between the scientists and other renewers, such as the philosophers. Although Sizoo and Koksma were certainly interested in the foundational questions of their own disciplines, they saw no possibility to incorporate their ideas in the philosophical system of Vollenhoven and Dooyeweerd. The conflicts that emerged in the 1930s between the philosophers, who viewed themselves as developing Kuyper’s ideas, and the theologians, whose chief aim was to defend and preserve Kuyper’s legacy, may have been a reason for the scientists to distance themselves from both the theologians and the philosophers.<sup>77</sup>

With their independent position, the founding fathers of the faculty paved the way for the later biologists and geologists at the VU, who were to accept the Darwinian evolutionary theory as part of the curriculum and their research programme in the 1950s and 1960s.<sup>78</sup> Due to these and similar choices, the history of the Dutch Calvinists developed in a completely different manner than, for example, that of the US fundamentalists, who crusaded against evolutionism in the 1920s and began to establish their own institutional base in the 1930s; in the 1960s, the ideal of ‘creation science’ came into being in the United States, but—although some sympathy for creationism arose in the Netherlands—at the VU it never had a chance of success.<sup>79</sup>

In the 1960s, for many people in Calvinist circles in the Netherlands, religion was beginning to become dissociated more or less from questions of worldview and reality. Science and religion were increasingly seen as two distinct spheres and the VU

<sup>75</sup> See the sketch of this ‘standard image’ in George Harinck, ‘Op losse schroeven. Gereformeerden en de moderniteit’ (with a summary in English: ‘Everything is unsettled. Dutch Neo-Calvinists and Modernity’) in *Moderniteit. Modernisme en massacultuur in Nederland 1914–1940* (note 5), 332–54 on 334–37. Harinck, however, criticizes this view in the rest of the article.

<sup>76</sup> Harinck (note 75), 339–52.

<sup>77</sup> Compare: Stellingwerff (note 53), 239–51; Van Deursen (note 10), 163–70.

<sup>78</sup> In 1950, a biology department, and in 1960, a geology department was founded. In particular, the biologist J. Lever and the geologist J.R. van de Fliert were active in the discussions on creation and evolution in Calvinist circles. See, for example, J. Lever, *Creatie en Evolutie* (Wageningen, 1956); and J.R. van de Fliert, ‘De aardwetenschappen aan de Vrije Universiteit’, in *Wetenschap en Rekenschap 1880–1980. Een eeuw wetenschapsbeoefening en wetenschapsbeschouwing aan de Vrije Universiteit*, edited by M. van Os en W.J. Wieringa (Kampen, 1980), 292–323, esp. 295–8.

<sup>79</sup> It even seems that the Dutch took the lead in propagating creationism (flood geology) in continental Europe in the 1960s. Sympathy for creationism in the Netherlands was limited, however, to relatively small factions in Evangelical and orthodox-Protestant circles, and it never came to such extensive discussions as in the USA. It is remarkable that one of the most devastating reviews of the influential creationist book of H.M. Morris and J.C. Whitcomb, Jr, *The Genesis Flood* (1961), was written by the VU geologist J.R. van de Fliert, ‘Fundamentalism and the Fundamentals of Geology’, *Journal of the American Scientific Affiliation*, September 1969. See also Numbers, *The Creationists* (note 3), 367, 409–10.

scientists had played an important role in the increasing acceptance of mainstream science. Belief was increasingly linked with topics such as responsibility and social justice. At the same time, the character of Dutch society started to change, and the ancient ‘pillars’ of Calvinist, Roman Catholic and socialist organizations were to crumble away, while the once orthodox Reformed Churches in the Netherlands began to absorb modernist tendencies.<sup>80</sup> A new chapter in the relation between science and religion at the secularizing VU started, which may be the subject of another paper.<sup>81</sup>

## 6. Conclusion

The formation of the Science Faculty turned out to be a first step on the way to the acceptance of mainstream science by the Dutch Calvinists. Although the professors certainly subscribed to the general neo-Calvinist position, the development of a Christian science over and above mainstream science was not their aim, and they felt that the impact of religion on science should not be overestimated. Why was it that on this point, the new professors differed so fundamentally from the founders of the university?

A reason was probably that, unlike the founders of the VU, they had to deal with the practice of science. They had been trained and ‘disciplined’ in the academic fields of chemistry, physics, and mathematics, and were still part of it when they became professors at the VU.<sup>82</sup> From the outset, they demarcated the domain of ‘pure’ scientific research, where religion does not play a direct role, from the domain where it does. For example, they had no hesitation about collaborating with colleagues at other universities and did not develop other isolationist activities, such as setting up separate journals for their scientific work or criticizing other scientists’ research for being unchristian.<sup>83</sup> For Sizoo, his positive attitude towards the results of contemporary science even included the radioactivity determination of the age of the Earth. To justify his position on this point, Sizoo at times referred to Kuiper, Bavinck, and Woltjer, who had also accepted a relative autonomy of the sciences. However, the scientists appear to have gone one step further than these ‘great men’, as they completely accepted an independent domain for scientific research. At the same time, however, they held on to the Kuyperian concept of religious presuppositions that underlie all science. This made it possible for them to hang on to the belief

<sup>80</sup> On the ‘depillarization’ of Dutch society, see J.C. Kennedy, *Nieuw Babylon in aanbouw: Nederland in de jaren zestig* (Amsterdam, 1995), esp. 97–101. On the changes in the Reformed Churches in the Netherlands: G. Dekker, *De stille revolutie. De ontwikkelingen van de Gereformeerde Kerken in Nederland tussen 1950 en 1990* (Kampen, 1992); and Maarten Aalders, *125 jaar faculteit der Godgeleerdheid aan de Vrije Universiteit* (Zoetermeer, 2005), 264–312.

<sup>81</sup> For a rough sketch of the discussions on science and religion in Calvinist circles in the 1960s and 1970s, see Flipse (note 10), 188–202.

<sup>82</sup> On the idea of ‘discipline’ as ‘a form of instruction to which one submits’ and the identity of the scientist see Jan Golinski, ‘Identity and Discipline’, in *Making Natural Knowledge. Constructivism and the History of Science. With a New Preface* (Chicago, 2005), 47–78, esp. 69.

<sup>83</sup> The efforts of the VU scientists can be seen as a kind of ‘boundary-work’ within the Calvinist subculture. They demarcated the domain of science (‘pure scientific research’)—where they collaborated with their co-scientists—from the domain of religion. Only in the latter domain were the Calvinist principles allowed to play a part in the discussion. For the concept of boundary-work, see Thomas F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago, 1999).

that they travelled their own path, although in practice their science differed from that of their co-scientists only on a very abstract level.

The attitude of Sizoo and his colleagues has certainly to do with their training as scientists, but it is also related to the changing position of science and religion in society in the early twentieth century. In the second half of the nineteenth century, science and religion *were* in conflict in a certain sense, mainly with respect to their role in society;<sup>84</sup> and it was against the idea that conflicts between science and religion are inevitable that Kuyper formulated his idea of a Christian science. These tensions disappeared when science increasingly became an independent field that diverged into disciplines that were considered more or less autonomous. Because of this development, conflicts between 'science' and 'religion' finally became unusual. Coops, Sizoo, and Koksma had still felt a certain tension between their orthodox faith and their scientific work during their student days, but the situation seems to have been less tense than in the nineteenth century.

The fact that the tensions between mainstream religion and science had diminished since the end of the nineteenth century was connected with the increasing criticism by the general public of the alleged reductionist and materialistic character of natural science. It was said that science had not solved the problems of society, but had contributed to a process of alienation from nature, and a decline of religious and moral values.<sup>85</sup> Yet, this criticism did not lead to a complete rejection of the sciences; rather, many argued that the sciences should widen their outlook for the immaterial and the teleological side of reality and for intuitive truths. Partly as a reaction to these ideas, many scientists in this period tried to get rid of their materialistic image in order to enlarge the social basis for science. Meanwhile, the content of science also changed: deterministic and mechanistic theories were dismissed, and indeterministic and holistic theories were developed. Simultaneously, and partly as a reaction to the increasing fragmentation in the sciences and in society, there was a wide demand for 'synthesis'. On these and similar grounds, many people in the 1920s and 1930s held the view that science could be reconciled with a form of religion.<sup>86</sup> The attitude of the young professors in the 1930s can also be understood as part of this new mentality. Especially Sizoo, in his philosophical articles, pointed to the new theories in physics, which he interpreted as less anti-religious than the science of the late nineteenth century. On this point, he was not alone in the Netherlands in this period: in contrast with an older generation, many scientists were concerned with philosophical questions,

<sup>84</sup> See, for example, Frank M. Turner, 'The Victorian conflict between science and religion: a professional dimension', *Isis*, 69 (1978), 356–76. Turner gives an interpretation of the conflict of 'science' and 'religion' in the second half of the nineteenth century in terms of professionalizing scientists who sought to banish the clergy from science. Although Turner's thesis has been criticized for various reasons, in my opinion his analysis of the professional dimension of some of the conflicts is still convincing. For a short survey of (other) historiographical opinions on the origin of the conflict thesis, see *God and Nature* (note 66), 6–9; and David N. Livingstone, 'Replacing Darwinism and Christianity', in *When Science and Christianity Meet* (note 1), 183–202, esp. 191–94. On the professionalization of the Dutch Universities in the late nineteenth century, see *A history of science in the Netherlands* (note 3), 130–69, esp. 130–40.

<sup>85</sup> R. Macleod, 'The "bankruptcy of science" debate: the creed of science and its critics, 1885–1900', *Science, Technology and Human Value*, 7 (no. 41) (1982), 2–15.

<sup>86</sup> Peter J. Bowler (note 3) describes this development for Britain, but similar tendencies appear to have existed among intellectuals in the Netherlands.

sometimes developing quite peculiar ideas.<sup>87</sup> For Sizoo and Koksma, philosophizing was a way to keep science and religion together. Nevertheless, when after some time the scientific disciplines became increasingly independent and the wide interest in philosophical issues declined, the importance of the Calvinist principles declined too, and from the 1950s science at the VU became less and less distinguishable from science at the other universities.

In sum: the late-nineteenth-century ideal of developing a Christian science was not adopted unchanged by the Calvinist scientists in the 1930s, who appropriated the ideas handed down to them for their own purpose. Although they dissented from the view that scientific knowledge and practice should be shaped by religious principles, they were committed to showing that science and faith were not in conflict. This view fitted in with a widely felt penchant for synthesis in the culture of the interbellum, but at least initially it made them somewhat isolated figures in their Calvinistic homeground.

### Acknowledgements

Writing this article, I have greatly benefited from the research I undertook for a book on the history of Physics and Astronomy at the Free University: Ab Flipse, *Hier leert de natuur ons zelf den weg. Een geschiedenis van Natuurkunde en Sterrenkunde aan de VU* (Zoetermeer, 2005). This article expands, from a particular perspective, on the relation between science and religion, which was one of the themes present in the book. I am most grateful to Dr Ida H. Stamhuis and professor Frans H. van Lunteren for their help and suggestions at various stages of the research and writing process and to professor Ronald L. Numbers for the stimulating discussion I had with him about some issues brought forward in this article. I would also like to thank David Baneke, professor H. Floris Cohen and Daan Wegener for their comments, and Dr T. Bas Jongeling for correcting my English.

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<sup>87</sup> For examples of Dutch scientists who engaged in philosophical discussions, see Klaas van Berkel, 'Wetenschap en wijsbegeerte in het werk van Jacob Clay', in Klaas van Berkel, *Citaten uit het boek der natuur. Opstellen over Nederlandse wetenschapsgeschiedenis* (Amsterdam, 1998); Kai de Jong en Frans van Lunteren, 'Fokkers "greep in de verte". Nederlandse fysica en filosofie in het interbellum', *Gewina. Tijdschrift voor de Geschiedenis der Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek*, 26 (2003), 1–21; and David Baneke, "'Synthese! Geef ons synthese!'" H.J. Jordan en het intellectuele debat tijdens het interbellum', *Gewina*, 28 (2005), 169–85. In many ways, the Dutch scientists in this period conform to the picture that Paul Forman has given of the German physicists during the early years of the Weimar Republic. See P. Forman, 'Weimar culture, causality, and quantum theory, 1918–1927. Adaptation by German physicists and mathematicians to a hostile intellectual environment', *Historical Studies in the Physical Sciences*, 3 (1971), 1–115.